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ABSTRACT

This monograph presents descriptions of six extensively researched and widely used cooperative learning methods and discusses research on the effects of cooperative learning. The term "cooperative learning" refers to instructional methods in which students of all levels of performance work together in small groups toward a common goal. The essential feature of cooperative learning is that the success of one student helps other students to be successful. The six methods are: (1) Student Teams Achievement Divisions (STAD); (2) Teams-Games-Tournaments (TGT); (3) Team-Assisted Individualization (TAI); (4) Jigsaw; (5) Learning Together; and (6) Group Investigation. Some methods are highly structured, with well-specified group tasks and group rewards, while others give more autonomy to students and have fewer specified group rewards. Some of these methods are used almost exclusively in social studies, and one is designed only for mathematics. Several can be used in all subject areas. All grade levels are represented. A case study of a junior high school student experiencing student team learning methods is presented, illustrating how team learning methods are used and where they are most effective. Reports are presented on research studies that examined the various methods of implementing student team cooperative learning. Their impact on academic achievement, intergroup relations, mainstreaming, and student self-esteem is discussed. The overall conclusion drawn from this research was that, when the classroom is structured so that students can work cooperatively on learning tasks, students benefit academically as well as socially. A 58-item bibliography is appended. (JD)

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What Research Says to the Teacher

Cooperative Learning:

Student Teams

by Robert E. Slavin

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INTRODUCTION

What Is Cooperative Learning?

Cooperation is one of the most important human activities. Elephants have survived as a species because of their size; cheetahs because of their speed; humans because of their ability to cooperate for the good of the group. In modern life, people who can organize as a group to accomplish a common end are likely to be successful in business, in sports, in the military, or in virtually any endeavor.

In fact, one of the few areas of human activity in which cooperation is not a primary focus is in the schools. In the classroom, helping between students may be punished as cheating. Students are typically in competition with one another for good grades, for teacher approval, and for other rewards. A result of this competition is that students do not encourage and may discourage one another's academic efforts.

To illustrate, think of a typical classroom. The teacher asks Billy to spell "chief." "C-H-E-I-F," he spells. The teacher says, "No. Can anyone help Billy?" Ten hands shoot up, and the teacher chooses Sam, who spells the word correctly.

Does Billy interpret Sam's answer as "help"? Of course not. He is embarrassed by his mistake, and quite possibly angry at Sam for making him look dumb. Sam experiences a momentary feeling of superiority over Billy, which reinforces a pecking order with the most able students at the top and the least able at the bottom. Sam and Billy are unlikely to help each other study their spelling; they are likely to try to discourage each other from studying too hard by expressing a norm that homework is for sissies.

Imagine that the structure of this classroom has been changed. Billy and Sam have been asked to work together. Now, their goal is to see how many points the two boys can earn together when they take their spelling tests. In this situation, Sam will want to make sure not only that he knows his own spelling words, but also that Billy knows his. Billy will feel the same responsibility for Sam's learning. Sam and Billy will want to help each other study and will encourage continued effort.

Such cooperative groups typically have an "all-for-one, one-for-all" attitude in which teammates help and encourage each other, applaud each other's successes, and console each other's setbacks.

This situation is one example of *cooperative learning* (43),* a term that refers to instructional methods in which students of all levels of performance work together in small groups toward a common goal. The essential feature of cooperative learning is that the success of one student helps other students to be successful. This is just the opposite of the traditional classroom, in which the competition for grades and for other rewards means that one student's success may reduce the chances of another's success.

Of course, cooperative learning methods are not new. Teachers have used them for many years in the form of laboratory groups, project groups, discussion groups, and so on. The recent research on cooperative learning has applied these methods to the teaching of basic skills, however, and has refined and systematized cooperative strategies to the point where they are now being used extensively in every conceivable subject, at grade levels from two through college, and in all kinds of schools throughout the world.

The Background of Cooperative Learning

Long before there were practical cooperative learning programs for classrooms, social psychologists studied the general topic of cooperation versus competition extensively. They found that when people work together toward a common goal, several things happen. First, they express norms in support of doing what helps the group achieve its goals (53). In the classroom, this means that when students are cooperating toward a group goal, they begin to tell one another that doing school work, coming to class every day, and other behaviors that help students learn are important, and are valued by the peer group. The cooperative group produces more and better ideas than do individuals working alone or competitively. For example, Deutsch (7) assigned a set of college psychology students to five-member groups to discuss human relations problems (such as deciding what a friend should suggest to a veteran who had had a girlfriend overseas and was unsure whether he should tell his wife about her) and puzzle problems (solving mathematical puzzles). In half of the groups, students were told that their group's responses to the problems would be ranked, and the rankings would be used to

*Numbers in parentheses appearing in the text refer to the Bibliography beginning on page 29.

determine the students' grades. All students in a group would receive the same grade. Because the group worked together toward a common goal (obtaining high grades for everyone), this was a cooperative condition. In the other half of the groups, students were told that the individual who contributed the most to the group solution (as determined by an observer) would receive the highest grade, the next highest participating student would receive a lower grade, and so on. Because students were individually compared (only one student could be the best participant), this was a competitive condition. The results of the study indicated that the cooperative groups solved the puzzle problems more rapidly, produced longer and better solutions to the human relations problems, and were rated more productive by observers. The cooperative group members were also rated more friendly, helpful, and attentive to one another, and enjoyed their task more than did the competitive group members. Other studies have found that cooperative discussion of reading passages increases retention of reading content (51), and cooperative discussion improves problem-solving behavior (23). In a nutshell, two (or more) heads are better than one for learning, both because cooperative peers encourage each other and because discussion itself aids learning.

One of the best-established findings concerning cooperation is that when individuals work together toward a group goal, they learn to like one another (7, 12, 28). This should hardly be surprising, as cooperation almost always increases positive, intimate contact between individuals, and these are the conditions that lead to the formation of friendships (30).

Finally, the research on cooperation consistently reports that people enjoy working together (15, 18, 28).

All these studies took place in social psychological laboratories or in laboratory-like settings, however. What happens when cooperation is transplanted to the real world of the classroom?

Cooperative Learning Methods

While laboratory research on cooperation dates back to the 1920's, research on specific cooperative learning methods dates back only to 1970. Then, at about the same time, several groups of investigators began designing and evaluating classroom applications of the principles of cooperation. These groups included the author, David DeVries, Keith Edwards, and their colleagues at Johns Hopkins

University; Elliot Aronson and his colleagues at the University of California at Santa Cruz; David Johnson, Roger Johnson, and their colleagues at the University of Minnesota; and Shlomo Sharan, Rachel Hertz-Lazarowitz, and their colleagues at the University of Tel Aviv (Israel). Each of these groups has developed and evaluated practical cooperative learning methods. These methods are described briefly in the following pages.

Student Teams-Achievement Divisions (STAD)

Student Teams-Achievement Divisions was developed by the author at Johns Hopkins University (40). It is part of the Student Team Learning program at Johns Hopkins, along with Teams-Games-Tournaments and Jigsaw II (see 45), and Team Assisted Individualization (49). In STAD, students are assigned to four- or five-member learning teams. The teams are made up of high-, average-, and low-performing students, boys and girls of different racial or ethnic backgrounds, so that each team is a microcosm of the entire class. Each week, the teacher introduces new material in a lecture or a discussion. The team members then study worksheets on the material. They may work problems one at a time in pairs, or take turns quizzing each other, or discuss problems as a group, or use whatever means they wish to master the material. The students also receive worksheet answer sheets; therefore it is clear to them that their task is to learn the concepts, not to simply fill out the worksheets. Team members are told that they have not finished studying until all their teammates are sure that they understand the material.

Following team practice, students take quizzes on the materials they have studied. On the quizzes teammates may not help one another; at this point they are on their own. After the quizzes are scored in class or soon after class, the teacher forms the scores into team scores.

The amount each student contributes to his or her team is determined by the amount the student's quiz score exceeds his or her past quiz average. A base score is set five points below each student's average, and students earn points, up to a maximum of ten, for each point by which they exceed their base scores. Students with perfect papers always receive the ten-point maximum, regardless of their base scores. An example of base scores and improvement points appears in Figure 1.

Student	Base Score	Quiz Score	Improvement Score
John	16	23	7
Mary	18	30	10
Tanya	23	30	7
Sam	16	27	10
Cheryl	17	17	0
Jose	21	23	2
Frank	18	17	0

Figure 1
Example of Base Scores and Improvement Points

This individual improvement score system gives every student a good chance to contribute maximum points to the team if (and only if) the student does his or her best, either showing substantial improvement or completing a perfect paper. This system has been shown to increase student academic performance even without teams (44), but it is especially important as a component of STAD since it avoids the possibility that low-performing students will not be fully accepted as group members because they do not contribute many points. To illustrate, think of a baseball team. Although it is a cooperative group, a baseball team has one serious drawback: the "automatic strikeout," the team member who rarely hits the ball no matter how much he or she practices. In STAD, no one is an automatic strikeout, and by the same token no one is guaranteed success, because it is improvement that counts, and anyone is capable of improvement.

A weekly one-page class newsletter recognizes the teams with the highest scores. The students who exceed their own past records by the largest amounts or who complete perfect papers also receive recognition in the newsletter. A typical STAD newsletter appears in Figure 2 (45, p. 22).

Teams-Games-Tournaments (TGT)

Teams-Games-Tournaments, originally developed by David DeVries and Keith Edwards of Johns Hopkins University, uses the same teams, instructional format, and worksheets as STAD (10, 11). In TGT, however, students play academic games in weekly tournaments to show their individual mastery of the subject matter. Figure 3 illustrates the game rules (45, p. 28). Students compete at tourna-

THE LITTLE LEDGER

SPOTSYLVANIA ELEMENTARY SCHOOL

Issue No. 5
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CALCULATORS OUTFIGURE CLASS!

The Calculators (Charlene, Alfredo, Laura, and Carl) calculated their way into first place this week, with big ten-point scores by Charlene, Alfredo, and Carl, and a near-perfect team score of 38! Their score jumped them from sixth to third in cumulative rank. Way to go Calcs! The Fantastic Four (Frank, Otis, Ursula, and Rebecca) also did a fantastic job, with Ursula and Rebecca turning in ten-pointers, but the Tigers (Cissy, Lindsay, Arthur, and Willy) clawed their way from last place last week to a tie with the red-hot Four, who were second the first week, and first last week. The Fantastic Four stayed in first place in cumulative rank. The Tigers were helped out by ten-point scores from Lindsay and Arthur. The Math Monsters (Gary, Helen, Octavia, Ulysses, and Luis) held on to fourth place this week, but due to their big first-place score in the first week they're still in second place in overall rank. Helen and Luis got ten points to help the M.M.'s. Just behind the Math Monsters were the Five Alive (Carlos, Irene, Nancy, Charles, and Oliver), with ten-point scores by Carlos and Charles, and then in order the Little Professors, Fractions, and Brains. Susan turned in ten points for the L.P.'s as did Linda for the Brains.

This Week's Rank	This Week's Score	Overall Score	Overall Rank
1st - Calculators	38	81	3
2nd - Fantastic Four } Tie	35	89	1
2nd - Tigers } Tie	35	73	6
4th - Math Monsters	40/32	85	2
5th - Five Alive	37/30	74	5
6th - Little Professors	26	70	8
7th - Fractions	23	78	4
8th - Brains	22	71	7

TEN-POINT SCORERS

Charlene (Calculators)
Alfredo (Calculators)
Carl (Calculators)
Ursula (Fantastic Four)
Rebecca (Fantastic Four)
Lindsay (Tigers)
Arthur (Tigers)
Helen (Math Monsters)
Luis (Math Monsters)
Carlos (Five Alive)
Charles (Five Alive)
Susan (Little Professors)
Linda (Brains)

Figure 2
Sample STAD Newsletter

Reader

1. Picks a numbered card and finds the corresponding question on the game sheet.
2. Reads the question out loud.
3. Tries to answer.

1st Challenger

Challenges if he or she wants to (and gives a different answer) or passes.

2nd Challenger

Challenges if 1st challenger passes, if he or she wants to. When all have challenged or passed, 2nd challenger checks the answer sheet. Whoever was *right* keeps the card. If the *reader* was wrong, there is no penalty, but if either challenger was wrong, he or she must put a previously won card, if any, back in the deck.

Figure 3
TGT Game Rules

ment tables with members of two other teams whose past performance is comparable to theirs. Thus, a high-performing student from the Fantastic Four might compete with high performers from the Pirates and the Superstars. Another table might have average-performing students from the Pirates, the Masterminds, and the Chiefs, and another might have low performers from the Superstars, the Tigers, and the Masterminds. Of course, the students are not told which is the highest table, which is next, and so on, but they are told that their competition will always be fair. Although teams stay together for about six weeks, the tournament table assignments change every week according to a system that maintains the quality of the competition. This equal competition makes it possible for students of all levels of past performance to contribute maximum points to their teams if they do their best, in the same way that the individual improvement score system in STAD makes it possible for everyone to be successful.

After the tournament and the figuring of team scores, a newsletter recognizes the highest-scoring teams and tournament table winners. Thus, TGT uses the same pattern of teaching, team worksheet study, individual assessment, equal opportunities for success, and team recognition as that used in STAD, but it uses academic games instead of quizzes.

Team Assisted Individualization (TAI)

Team Assisted Individualization is the most recently developed of the Johns Hopkins Student Team Learning methods (49). Designed by the author, Nancy Madden, and Marshall Leavey, it is a combination of team learning and individualized instruction applied to the teaching of mathematics. In TAI, students are assigned to four- or five-member heterogeneous teams as in STAD and TGT. After placement in the appropriate unit by means of a diagnostic test, each student works through a set of programmed mathematics units at his or her own pace. Students follow a regular sequence of activities, involving reading an instruction sheet, working on successive skillsheets that break the skill into fine subskills, taking a checkout to see if they have mastered the skill, and finally taking a test. Team members work in pairs, exchanging answer sheets and checking each other's skillsheets and checkouts. When a student has passed a checkout with a score of 80% or better, she or he takes a final test which is scored by a student monitor. Students' test scores and the number of tests they can complete in a week make up a team score; team members receive certificates for exceeding preset team standards. Because of the preset standards, any number of teams can receive certificates.

Because teammates score all skillsheets and checkouts and student monitors score all tests, the teacher is able to work with individuals and small groups on specific problems or to prepare them for upcoming units.

TAI is unique among all the cooperative learning methods in its use of individualized rather than class-paced instruction. It was developed for use with classes too heterogeneous to be taught the same material at the same rate, especially classes with mainstreamed children who need the positive social interaction that takes place in the teams but who also need material at their own level.

Jigsaw

Jigsaw was originally designed by Elliot Aronson and his colleagues at the University of Texas and then at the University of California at Santa Cruz (2). In Aronson's Jigsaw method, students are assigned to six-member teams to work on academic material broken down into five sections. For example, a biography might be divided into early life, first accomplishments, major setbacks, later life, and impact on history. Each team member reads his or her unique section, except for two students who share a section. Next, members of different teams who have studied the same sections meet in "expert groups" to discuss their sections. Then the students return to their teams and take turns teaching their teammates about their sections. Since the only way students can learn other sections than their own is to listen carefully to their teammates, they are motivated to support and show interest in one another's work.

The author developed a modification of Jigsaw at Johns Hopkins University and then incorporated it in the Student Team Learning program (45). In this method, called Jigsaw II, students work in four- or five-member teams as in TGT and STAD. Instead of each student being assigned a unique section, all students read a common narrative, such as a book chapter, a short story, or a biography. However, each student receives a topic on which to become an expert. Students with the same topics meet in expert groups to discuss them, after which they return to their teams to teach what they have learned to their teammates. Then, students take individual quizzes, which result in team scores based on the improvement score system of STAD, and a class newsletter recognizes the highest-scoring teams and individuals.

Learning Together

David and Roger Johnson at the University of Minnesota developed the Learning Together model of cooperative learning (24). The methods they have researched involve students working in four- or five-member heterogeneous groups on assignment sheets. The groups hand in a single sheet, and receive praise and rewards based on the group product.

Group-Investigation

Group-Investigation, developed by Shlomo Sharan at the University of Tel Aviv, is a general classroom organization plan in which students work in small groups using cooperative inquiry, group discussion, and cooperative planning and projects (36). In this method, students form their own two- to six-member groups. After choosing subtopics from a unit being studied by the entire class, the groups further break their subtopics into individual tasks, and carry out the activities necessary to prepare group reports. Each group then makes a presentation or display to communicate its findings to the entire class.

Other Cooperative Learning Methods

These six techniques described are by far the most extensively researched and widely used cooperative learning methods, but there have been a few interesting studies of other methods. Wheeler investigated a cooperative technique in which students were assigned specific roles within cooperative groups and worked on social studies inquiry activities to produce a single workbook (56, 55). The group making the best workbook received a prize. Another study used a combination of cooperative methods including group information gathering, discussion, and interpretation, with prizes given to groups with the best products (54). Still another study evaluated a program in elementary mathematics in which students were rewarded with prizes based on the average of the lowest three quiz scores in their seven-member groups (19).

Thus, the cooperative learning methods share the idea that students work in groups to accomplish a group goal, but in every other particular they are quite different from one another. Some—STAD, TGT, and TAI—are highly structured, with well-specified group tasks and group rewards (recognition in a newsletter or certificates), whereas others—Group-Investigation and Learning Together—give more autonomy to students and have fewer well-specified group rewards. Jigsaw, Group-Investigation, and the Wheeler methods are used almost exclusively in social studies, and TAI is designed only for mathematics; STAD, TGT, and Learning Together are used in all subjects. Learning Together, Group-Investigation, and TAI are used primarily in elementary schools; STAD, TGT, Jigsaw, and Jigsaw II

are used at all grade levels. The three original Student Team Learning methods (STAD, TGT, and Jigsaw II) use competition between teams to motivate students to cooperate within their teams, whereas Group-Investigation, Learning Together, TAI, and the original form of Jigsaw do not. Finally, STAD, TGT, and TAI are designed to help students learn a specific set of skills, such as adding fractions, putting commas in a series, reading charts and graphs, or understanding how chemical compounds are formed; whereas Group-Investigation in particular is designed primarily to encourage students to think creatively about social studies concepts and to learn group self-organizational skills.

A Day in the Life of Jim James

To illustrate what happens in cooperative learning classes, consider the following example (adapted from an earlier work of the author) of a junior high school student who is experiencing the three principal Student Team Learning methods, STAD, TGT, and Jigsaw II (45, pp. 7-8).

Jim James is a seventh grader at Hooperville Junior High. Jim's first class is social studies, where his teacher, Mr. Thomas, is using Jigsaw II to teach a unit on Alexander Hamilton. Yesterday Mr. Thomas handed out expert sheets and social studies books, and everyone read the biography of Hamilton. The expert sheet contained four topics related to a biography of Alexander Hamilton: (1) What were the main events of Hamilton's early life? (2) How was Hamilton involved in the ratification of the Constitution? (3) What were Hamilton's early writings? (4) What were Hamilton's political beliefs? Mr. Thomas had assigned Jim the fourth topic, so Jim had read looking for information on Hamilton's political beliefs.

Today Mr. Thomas asks the class to be quiet. "Now," he says, "you may all get into your expert groups." Mr. Thomas points out places for each expert group to meet, and the students with the same topic sit together. Cynthia, who is from another team, starts the discussion at Jim's table: "The main thing I got from the chapter is that Hamilton was always disagreeing with Thomas Jefferson and Aaron Burr." Jim says, "Yes, but that's not the main point. I think we should concentrate on whether Hamilton was really a royalist or not." The group members talk for about 20 minutes, sharing their ideas about

the material they have read and discussing the important points. At the end of that time, Mr. Thomas asks the students to return to their teams.

Jim sits with his teammates. Soo Mi, a Korean student who studied about Hamilton's early life, begins to teach her topic first. In spite of her problems with English, her teammates encourage her to keep going because they need to understand what she has to say. She tells of Hamilton's birth in Nevis, in the Caribbean. When Sam asks where the Caribbean is, Yolanda tells him. Soo Mi continues with an explanation of how Hamilton came to America, his first job, his role in the American Revolution, and other details. Then Sam tells how Hamilton was involved in the ratification of the Constitution. Next, Yolanda tells the group about the Federalist Papers, and other writings by Hamilton. Finally, it is Jim's turn, and he describes Hamilton's political positions. During this time, Mr. Thomas moves from team to team, answering questions, clearing up disagreements, and helping individual students focus on important points. Finally, Mr. Thomas has the students put away their books, and he hands out a quiz on the life of Alexander Hamilton. Jim does well on everything except one question about Hamilton and the ratification of the Constitution. He reminds himself to ask Sam more questions the next time they do a Jigsaw unit. The bell rings, and Jim is off to his next class, English.

Jim's English class is using STAD, and today is worksheet day. Yesterday Mrs. Cooper introduced the idea of commas in a series to the whole class. Today, to prepare for tomorrow's quiz, the teams will study worksheets about the use of commas.

Jim's team is called Cooper's Raiders. As the class begins, the Raiders assemble around a table to study their worksheets. Jim pairs off with Alex and quizzes him on the material. After the first item, "My dog buried a bone a boot and an apple in the back yard." Alex says, "That's easy. The commas go after 'bone' and 'apple'." Jim disagrees, and they check the answer sheet. Sure enough, Jim is right. He explains to Alex that commas go after each item in a series except the last item. Alex complains that last year he was taught that a comma isn't needed after the item in a series that comes before the "and." Jim and Alex call Mrs. Cooper over to explain, and she agrees with Jim that commas go after all items in a series except the last item, but she also tells Alex that many people disagree with this rule. Then she thanks the students for doing such a good job helping each other with their work.

After Jim has quizzed Alex on most of the items, Alex quizzes Jim. When both students feel confident about their abilities to put commas in a series, they check to see how their teammates, Cynthia and Diane, are doing. Everyone on the Raiders wants to receive a good score on the quiz. The Raiders finished last in the first week's team competition, fourth in last week's, and now they hope to break into the top three, so that their team will receive special mention in the class newsletter. By the end of the period, all four teammates feel confident and look forward to the quiz the next day.

After gym and lunch, Jim goes to math class. This class is using TGT, and today is tournament day—the high point of the week. Jim's team, the Euclid Kids, has been studying geometry hard all week because the team members want to keep their first-place position in the TGT competition. In fact, Jim and one of his teammates stayed after school yesterday to ask for material to study at home! Because his grades in math had always been poor, Jim had started in the TGT competition at one of the lower tables, competing with others who had had poor grades in math. However, Jim has been the highest scorer in his tournaments and has gradually moved to one of the higher tables. Now his competition is stiffer than ever.

As the students arrive, Mr. Cartwright assigns them to their tournament tables, where they will compete to add points to their team scores. Jim worries a little when he sees his two competitors. One of them, Charlene, has a reputation as the smartest girl in the class, and the other, Luis, is a student who, like Jim, has been winning consistently in the TGT tournaments. Can Jim come through for the Euclid Kids this week?

The TGT game consists of geometry items similar to the ones the students studied. When the three students at Jim's table draw cards to see who goes first, Jim wins. He picks the top card, which has the number 21 on it, and looks down his game sheet for item 21, which reads: "What is the circumference of a circle with a diameter of 3 centimeters?"

This question was not on the worksheets he had studied with his team, but Jim thinks he understands circles pretty well. He scribbles some figures on a piece of paper and says, "18.8 centimeters."

Now Luis, sitting on Jim's left, has the right to challenge. He does some figuring and then challenges. "I think it's 9.4 centimeters." Charlene checks the answer sheet. "Luis is right," she says, "it's 9.4 centimeters. Jim, I think you were thinking of radius instead of diameter." Luis keeps card number 21 to count as his point for a

correct answer, and picks the next card to indicate the next question in the tournament. All period the play continues around the table. At the end, Luis has the most cards and thus contributes six points to his team's score; Jim is next and contributes four points to his team's score; and Charlene is third and contributes two points to her team's score. When the period is over and Jim tells his teammates how he did, they are glad that he did so well against such tough competition. "I think we'll be in the top three," one of his teammates says. "I won at my table and Susan won at hers. If we aren't in first place this week, we'll get 'em next week."

The example of Jim James's day illustrates the main features of cooperative learning in general, and Student Team Learning in particular. It is characteristic of all the Student Team Learning methods, including TAI, that the purpose of the team is to prepare its members for an individual assessment (a quiz or a game). Jim wants to help his teammates so that they can do well on their individual assessments, as they want to help him. The camaraderie and team spirit that Jim experiences are characteristic of all the cooperative learning methods. Without these ingredients, cooperative learning doesn't work, because if students don't care about their teams or their teammates, they are unlikely to help or encourage one another. But the main point that Jim's experience is meant to convey is that when students work in small groups, they look forward to class as a social, fun, as well as challenging, environment.

However, schools are not built just for students to have fun. What are the effects of learning cooperatively on the important goals of schooling?

RESEARCH ON COOPERATIVE LEARNING

Academic Achievement

Because achievement is the outcome of primary interest to schools, almost all the studies of cooperative learning have measured it.

In general, cooperative learning has been quite effective in increasing student achievement. There are at present 36 field experimental

studies of cooperative learning, in which cooperative learning methods were compared to control groups for periods of at least 2 weeks, more commonly 8 to 16 weeks (see 43). Of these, 32 measured student achievement. Twenty-one found significantly greater achievement in the cooperative method groups than in the control groups, 10 found no difference, and 1 found a slight advantage for the control group. The grade levels of these studies varied from three to twelve, subject areas from mathematics to language arts to social studies to reading, and settings from urban to suburban to rural.

The studies of cooperative learning vary in research methods as well as in findings. For example, Edwards, DeVries, and Snyder, in a study of TGT in a Baltimore junior high school, randomly assigned two seventh grade math classes to a TGT group and two to a control group (14). The same teacher taught all four classes. Students were pretested on the computations subtest of the Stanford Achievement Test and a Divergent Solutions test designed to measure their ability to think of as many ways as possible to make equations using a given set of numbers and operations. The experimental students then experienced TGT for nine weeks, while the control students received worksheets and quizzes (instead of teams and games) covering the same content. Results from the posttest indicated the the TGT students showed significantly more learning on both tests, controlling for the pretests. The STAD studies used similar methods. For example, Madden and Slavin randomly assigned six classes in a Baltimore elementary school to STAD or control conditions (32). A third grade teacher, a fourth grade teacher, and a sixth grade teacher each taught one STAD class and one control class for seven weeks. The study results indicated that students in the STAD classes learned significantly more (controlling for pretests) than control students, as indicated by a test covering the objectives taught in all classes.

Other studies used different research methods. In the one study of the original Jigsaw method that found positive effects on student learning, ten teachers volunteered to teach their fifth and sixth grade social studies classes using the Jigsaw method for two weeks, and three "traditional" teachers were selected to serve as a control group (31). The results indicated that students in the Jigsaw classes had higher posttest scores (controlling for past reading scores and pretests) than the control classes. Black and Mexican-American students, who made up about 20 percent of the sample, showed outstandingly large gains. The study of Group-Investigation by Sha-

ran, Ackerman, and Hertz-Lazarowitz involved ten teachers in an Israeli elementary school, two teachers at each grade level from second through sixth grade (35). At each grade level one teacher volunteered to use Group-Investigation, the other used traditional methods. The paired teachers at each grade level agreed on a common set of objectives and contributed items to a test on the objectives. The teachers used their methods for three weeks, and gave the tests at the end. The results showed that only in the second grade did students in the Group-Investigation classes show greater learning than students in the control group on informational questions. On questions involving identifying concepts, analyzing problems, and imagination, however, Group-Investigation students in grades, two, four, and six showed significantly greater gains, controlling for student reading scores. In the third and fifth grades there were no achievement differences.

As in these examples, all the research on cooperative learning summarized in this publication involved comparisons between experimental (cooperative learning) and control groups. In some studies classes were randomly assigned to experimental or control groups; in others, teachers volunteered to be in one group or the other, but efforts were made to see that the teachers were similar in experience, commitment, and so on. Some of the studies used standardized tests, whereas others used special tests to measure specifically what was taught in the experimental and control groups. Significant differences were not always found for every comparison. For example, the Sharan, Ackerman, and Hertz-Lazarowitz study just described found significantly positive effects for low-cognitive-level items in second grade only, and for high-cognitive-level items in second, fourth, and sixth grades, but not in third and fifth grades (35). In this publication, however, studies are considered to have had a positive effect on student achievement if they demonstrated statistically significant differences in favor of the cooperative learning group on one or more of their major achievement measures with no differences favoring the control group.

The most extensively evaluated cooperative learning methods and the most successful in terms of academic achievement are STAD, TGT Jigsaw II, and TAI, the Johns Hopkins Student Teams Learning methods (see 43). They have been evaluated in 23 studies, with 17 significantly positive findings and no cases of results favoring the control group. One of these studies evaluated the three original Student Team Learning methods together (STAD, TGT, and Jigsaw

II) and found positive effects when compared with a control group on students' language arts and reading achievement (48). STAD and TGT have been most successful in mathematics, language arts, and reading. Positive effects of STAD and TGT on student achievement have been found to be equal for high, average, and low achievers, for elementary and junior high school students, for urban, suburban, and rural schools, and for boys and girls. The positive effects have been seen for Blacks as well as Whites, and are especially strong for Blacks (50). Two TGT studies with emotionally disturbed adolescents found no achievement differences (22, 37), although both studies did find positive effects of TGT on social and academic behaviors (see the section on Mainstreaming which follows).

The study of the original Jigsaw method just described found positive effects on social studies achievement (31), and a study of Jigsaw II found the same result (58). The Johnsons' Learning Together studies have been less successful in increasing academic achievement. In one study on language arts, there were no differences in achievement (26); whereas in another on mathematics, the cooperative students retained less than the control students (27). The Group-Investigation study on achievement just described found differences between the cooperative and control groups on recall and skills in only one grade out of five, but it did find differences in social studies understanding, application, and evaluation skills in favor of the Group-Investigation classes in three grades (35). Wheeler found greater social studies achievement in a cooperative group than in a control group (55). Additionally, he found that students who were predisposed to cooperative learning did better in cooperative classrooms, whereas students who were predisposed to competitive methods did better in competitive classrooms. Similar methods employed by Wheeler and Ryan found no difference between cooperative and control students in social studies achievement, however (56). Other researchers found more mathematics achievement in cooperative groups in which student rewards were based on their lowest three scores than in situations in which student rewards were based on individual achievement (19).

Although the positive effects of cooperative learning are reasonably well established, there remain several controversies and problems relating to particular practices and even to explanations of the findings. For example, there is some debate over the costs and benefits of using the competition-between-groups characteristic of the original Student Team Learning methods (STAD, TGT, and

Jigsaw II), but not of Group-Investigation, Learning Together, TAI, or the original Jigsaw. The question of whether individuals who are predisposed to cooperation do better in a cooperative treatment, originally raised by Wheeler (55), is currently being debated and studied. This is of particular importance because it is known that Mexican-Americans, American Indians, and Blacks are more predisposed to cooperation and are more peer-oriented than are Anglos (29, 34). A related question is whether or not cooperative learning methods have outstandingly positive effects on the achievement of black students. This has been observed in three studies (31, 38, 50), but not in a fourth (42). The latest study also provided evidence that the outstanding gains seen for Blacks were not simply due to Blacks starting lower in achievement (50). Another study suggests that Blacks may do exceptionally well in Student Team Learning methods (STAD, TGT, and Jigsaw II) because of the equal opportunities for success built into these methods (4). At present, no firm conclusions can be drawn; racial differences in the effects of cooperative learning on achievement remain a perplexing problem. With respect to the more general question of for whom cooperative learning works best, there is about as much evidence that high achievers gain the most from cooperative methods (13, 21, 33) as that low achievers gain the most (9, 14), even though it was originally expected that low achievers would be the greatest gainers.

A few studies have broken cooperative learning methods into their components to try to discover what accounts for their effects. Surprisingly, one study of STAD (41) and one of TGT (21) found that the fact that students could tutor one another did *not* contribute significantly to the effects of these methods on achievement. In both studies, students who were in teams but who could not interact during class learned as much as students who were in teams but who could interact, but more than students who were not in teams at all. In both studies, the provision of team rewards (recognition in a newsletter for the highest-scoring teams) apparently made the difference. In other words, cooperative learning methods may work primarily because they prompt students to encourage one another to do well.

Finally, there is the issue of individual accountability. Some of the cooperative learning methods simply involve allowing students to work together, handing in a single worksheet or other group product. Others, especially the Student Team Learning methods (STAD, TGT, Jigsaw II, and TAI), use scoring systems in which each student

receives an individual score, the sum of the team members' scores forms a team score, and this total score is the basis of team rewards. These methods thus emphasize individual accountability as well as group cooperation.

The cooperative learning methods that involve the least individual accountability have been the least successful in increasing student achievement. These include the Learning Together studies, of which one found no differences between the experimental and control groups (26) and another found that the control group learned more than the experimental group (27). Peterson and Janicki used a method that also did not require individual accountability of group members, and they, too, found no experimental-control differences in achievement (33).

Intergroup Relations

As noted previously, one of the earliest and strongest findings in the laboratory research on cooperation was that people who cooperate learn to like one another. Not surprisingly, the cooperative learning classroom studies have found quite consistently that students express greater liking for their classmates in general as a result of participating in a cooperative learning method (see 43). This is important in itself. Liking among students is especially important, however, when the students have different ethnic backgrounds. Anyone who has spent much time in a desegregated junior or senior high school knows that white students associate mostly with white students, black students with black students, Hispanics with Hispanics, and so on. Such an observation is always a blow to those who have hoped that desegregation would lead by itself to increased contact and improved relations between students of different ethnic groups. Further, there is substantial evidence that, left alone, ethnic separateness in schools does not naturally diminish over time (16).

Social scientists have long advocated interethnic cooperation as a means of ensuring positive intergroup relations in desegregated settings. The famous Social Science Statement submitted as part of the *Brown* v. *Board of Education* school desegregation decision strongly emphasized that positive intergroup relations would arise from school desegregation if and only if students were involved in cooperative, equal-status interaction sanctioned by the school (see 46).

The research on cooperative learning methods has borne out the expectations of the social scientists who participated in the *Brown* v. *Board of Education* statement. Cooperative learning methods embody the requirements of cooperative, equal-status interaction between students of different ethnic backgrounds sanctioned by the school. In most of the research on intergroup relations, students were asked to list their best friends at the beginning of the study and again at the end. The number of friendship choices students made outside their own ethnic groups was the measure of intergroup relations. All four of the STAD studies that took place in desegregated schools found positive effects on intergroup relations, as measured by increased cross-ethnic choices on students' lists of best friends (39, 42, 50, 52). Three of four TGT studies in desegregated schools found the same effects (8); the fourth, which lasted only four weeks, found no differences. One Jigsaw study found no effects on intergroup relations (5), but two Jigsaw II studies did find positive effects of this method on intergroup relations (17, 57). Three other studies also found positive effects of cooperative learning on intergroup relations (6, 25, 54).

Two of these studies, one on STAD (42) and one on Jigsaw II (58), included followups of intergroup friendships several months after the end of the studies. Both found that even months after the end of the study, students who had been in cooperative learning classes still named significantly more friends outside their own ethnic groups than did students who had been in control classes.

As is the case for achievement, the effects of cooperative learning on intergroup relations apply across kinds of schools, subjects, student ages, and other dimensions. The STAD and TGT studies took place in east coast urban and suburban schools in which the principal ethnic groups were Blacks and Whites. The Cooper et al. (6) and Johnson and Johnson (25) studies also involved primarily black and white students; but the Jigsaw studies and the Wiegel, Wiser, and Cook (54) study took place in western urban and rural schools with Mexican-American, Black, and Anglo students, while the Ziegler (58) study took place in Toronto, where the major ethnic groups were Anglo-Canadians and children of recent European immigrants. Regardless of the ethnicities involved, the cooperative learning strategies apparently make it possible for students to see one another in a positive light and to form friendships based on human qualities rather than on skin colors or accents.

Mainstreaming

Although ethnicity is a major barrier to friendship, it is not so large as the one between physically or mentally handicapped children and their normal-progress peers. The mandate of Public Law 94-142 to place as many children as possible in regular classrooms has created an unprecedented opportunity for handicapped children to take their place in the mainstream of society. It has also created enormous practical problems for classroom teachers, however; and it often leads to social rejection of the handicapped children. Because cooperative learning methods have been successful in improving relationships across the ethnicity barrier—which resembles the barrier between mainstreamed and normal-progress students—these methods have also been applied to increase the acceptance of the mainstreamed student.

The research on cooperative learning and mainstreaming has focused on the academically handicapped child. In one study, STAD was used to attempt to integrate students performing two years or more below the level of their peers into the social structure of the classroom. The use of STAD significantly reduced the degree to which the normal-progress students rejected their mainstreamed classmates, and increased the academic achievement and self-esteem of all students, mainstreamed as well as normal-progress (32). Other research using cooperative teams has also shown significant improvements in relationships between mainstreamed academically handicapped students and their normal-progress peers (3, 6). In addition, one study in a self-contained school for emotionally disturbed adolescents found that the use of TGT increased positive interactions and friendships among students (39). Five months after the study ended, these positive interactions were still found more often in the former TGT class than in the control class. In a study in a similar setting, Janke found that the emotionally disturbed students were more on-task, better behaved, and had better attendance in the TGT classes than in the control classes (22).

Perhaps the most important fact about cooperative learning methods in the mainstreamed classroom is that these techniques are not only good for the handicapped children, but they are among the very few methods for helping these students that also have a clear benefit for all children in terms of academic achievement.

Self-Esteem

One of the most important aspects of a child's personality is his or her self-esteem. Many people have assumed that self-esteem is a relatively stable attribute of a person that schools have little ability to change. Several researchers working on cooperative learning techniques have found, however, that teams do increase students' self-esteem. Students in cooperative learning classes have been found to have more positive feelings about themselves than do students in traditional classes. These improvements in self-esteem have been found for TGT (8a), for STAD (32), for Jigsaw (5), and for the three methods combined (48). Improvements in student self-concept in mathematics and in ratings of student self-concepts by teachers have also been found for TAI (49). Why does this occur? First, it has been consistently found that TGT and STAD students report that they like others and feel liked by others more than control students do (47). Liking of others and feeling liked by others are obvious components of feeling worthwhile. Second, it seems probable that students feel (and are) more successful in their school work when they work in teams than when they work independently. This can also lead to an increase in self-esteem. Whatever the reason, the effect of cooperative learning on self-esteem may be particularly important for its long-term effects on mental health. A student who has had a cooperative, mutually supportive experience in school may be less likely to be antisocial, withdrawn, or depressed in later life. In fact, a remarkable study in the Kansas City (Missouri) schools found that lower socioeconomic-status students at risk of becoming delinquent who worked in cooperative groups in sixth grade had better attendance, fewer contacts with the police, and higher behavioral ratings by teachers in seventh through eleventh grades than did control students (20).

Other Outcomes

In addition to effects on achievement, positive intergroup relations, greater acceptance of mainstreamed students, and self-esteem, effects of cooperative learning have been found on a variety of other important educational outcomes. These include liking of school, development of peer norms in favor of doing well academically,

feelings of individual control over the student's own fate in school, and cooperativeness and altruism (see 47). TGT (10) and STAD (40, 22) have been found to have positive effects on students' time on-task, a variable that is beginning to assume increasing importance as educators become more concerned about the productivity of schools.

CONCLUSION

The positive effects of cooperative learning methods on a variety of student outcomes are not found in every study or for every method, but the overall conclusion to be drawn from this research is that when the classroom is structured in a way that allows students to work cooperatively on learning tasks, students benefit academically as well as socially. The greatest strength of cooperative learning methods is the wide range of positive outcomes that has been found for them in the research. Although there may be many ways to improve relationships between students of different ethnic backgrounds or between mainstreamed and normal-progress students, few can also help to improve student achievement. And although there are certainly many ways to accelerate student learning in one of more subjects or grade levels, few apply equally well in almost all subjects and grade levels; and fewer still can document improvements in learning and also show improvements in students' social relationships, self-esteem, liking of school, and other outcomes.

Other special features of all the cooperative learning methods are their inexpensiveness and their ease of use. In their simplest form, all that these methods require is that the teacher assign students to small teams, give them material to study together, assess them based on their team performance, and give them some kind of recognition or reward based on their team performance. Teachers need minimal training to use these techniques. Detailed teacher's manuals are available for the Johns Hopkins Student Team Learning methods, TGT, STAD, and Jigsaw II (45). Books describing the original Jigsaw (2), the Learning Together model (24), and Group-Investigation (36) are also available. Hundreds of teachers have successfully used these methods, especially the Student Team Learning techniques, with nothing more than the manuals or books, and hundreds more have done so after a one-day workshop. Once

teachers know how to use them, the methods require little or no additional preparation time.

Because of their effectiveness, their practicality, and, perhaps most importantly, the fact that teachers and students simply enjoy using them, cooperative learning methods are being used more and more widely throughout the United States and several foreign countries. More than three thousand schools are using the Student Team Learning methods from Johns Hopkins University, and that number is constantly growing.

In sum, the research on cooperative learning methods supports the usefulness of these strategies for improving such diverse outcomes as student achievement at a variety of grade levels and in many subjects, intergroup relations, relationships between mainstreamed and normal-progress students, and student self-esteem. Their widespread and growing use demonstrates that in addition to their effectiveness, cooperative learning methods are practical and attractive to teachers. The history of the development, evaluation, and dissemination of cooperative learning is an outstanding example of educational research resulting in directly useful programs that have improved the educational experience of thousands of students and will continue to affect thousands more.

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